

Notes on the Life History of *Zestusa dora* (W. H. Edwards)  
(Lepidoptera: HesperIIDae)

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**Abstract:** *Zestusa dora* (W. H. Edwards) (HesperIIDae) is closely associated with oak-juniper scrub in the southern Arizona mountains, where it was studied in April and May in Cochise Co., Arizona. Eggs and young larvae were found in April, 1969, on *Quercus Emoryi* Torrey and reared through on this and other species of *Quercus*. The beginning of the life cycle coincides with the beginning of the spring growth of the *Quercus* and also with wider availability of water. The adults drink water whenever possible but seldom visit flowers. Descriptions are given of the chief characteristics of the eggs, larvae and pupae. Structures on the dorsocaudal edge of the prothorax and around the prothoracic spiracle of the pupa are probably of generic importance.

During April and May of 1969 the writer, while at the Southwestern Research Station of The American Museum of Natural History, near Portal, Cochise Co., Arizona, made observations of the life history, habits and ecology of *Zestusa dora* (W. H. Edwards). This common skipper of the Southwest and northern Mexico does not appear to have been hitherto reared. Adults were observed between 15 April and 10 May every time the right environment was visited and the weather was favorable. The localities where the species was seen were: Campground, South Fork, Cave Creek Canyon, alt. about 5300 ft.; S. W. Research Station, Cave Creek Canyon, alt. 5400 ft.; Ash Spring; Herb Martyr Dam Campground; and several locations along the road from Cave Creek Canyon to Onion Saddle, altitudes 6400 ft. to 7000 ft.

ECOLOGY AND ADULT BEHAVIOR

The species was always found associated with the open oak-juniper scrub that occupies large areas in the lower parts of the Chiricahua and similar Arizona mountain ranges. Adults were always associated with *Quercus arizonica* Sarg. and *Q. Emoryi* Torrey, the two dominant oaks of the region. The appearance of the adults from hibernating pupae is closely in phase with the beginning of seasonal growth of the oaks, i.e., shedding the leaves that have persisted from the previous year, the opening of the buds and the appearance of flowers and new leaves. The eggs thus hatch in time for the larvae to do most or all of their feeding on the new leaves. Adults were commonly seen flying among and over the foliage, sometimes in considerable numbers. On 18 April about 15 were seen actively flying in and out of, and alighting in, a *Q. Emoryi* by the roadside

about  $\frac{1}{2}$  mile above Turkey Creek. None of these was seen to oviposit; but a little later two females were seen to oviposit on an adjacent *Q. Emoryi*, although the eggs were not found. On other occasions the same thing was noted: the tendency of the adults to concentrate on one particular tree. The trees that the adults flew about, and those on which eggs and larvae were found, were all *Q. Emoryi*; but there is no reason to rule out *Q. arizonica* as a food plant.

Wherever water was available the adults spent much time drinking from mud or wet rocks. This was observed near the Research Station, and at Herb Martyr Dam, Ash Spring and Turkey Creek. One adult was watched crawling on the moist surface of a small stem gall on a *Q. Emoryi* with its proboscis extended. Another was seen to insert its proboscis in a small drop of spittlebug (Cercopidae) secretion on a *Q. Emoryi* leaf. There were many such drops of secretion available. Only one adult was seen visiting a flower, which was of *Ceanothus integerrimus* Hook. & Arn., although there were many clumps of this shrub, and of *Berberis wilcoxi* Kearney, blooming in the environments. The flowers of these shrubs were being eagerly visited by adults of *Leptotes marina* (Reakirt), *Erora quaderna* (Hewitson), *Callophrys (Mitoura) spinetorum* (Hewitson) and *siva* (W. H. Edwards), and *Erynnis juvenalis clitus* (W. H. Edwards).

#### EARLY STAGES

Eggs and larvae were found as follows, all on the particular *Q. Emoryi* tree about which so many individuals were seen flying on 18 April. One second instar larva was found on 25 April, in a small flap nest in a young leaf. An eggshell and a recently emerged larva were found on a bud scale on 1 May. On 10 May, Killian Roeber and I found 2 eggshells, 1 unhatched egg and 6 second instar larvae, all on leaves. The larvae were all in small flap nests, made by cutting out two sides of a small rectangle at the edge of a leaf and folding and fastening this beneath the leaf. Of this material I was able to carry back to New York and rear through the pupal stage 3 individuals, despite the fact that the food plant had to be changed twice, first to *Quercus gambeli* and then to *Q. alba*. Pupae were formed about 1 June and on 15 June and 18 June. The adults never succeeded in emerging from the pupae, perhaps because of failure to break a diapause. However, they became fully formed, so that when all hope of their emergence was abandoned the pupal shells were opened and positive identification was made.

EGG. The freshly laid egg was yellowish green; it became yellower as it matured. It is a truncate cone with a maximum diameter of about 1.2 mm., slightly smaller in diameter basally and considerably smaller in diameter distally. (The exact length and the distal structures were undeterminable because of eating by the emerging larvae.) One egg had 14, the other 15, strongly protruding longitudinal



ridges, the spaces between which were crossed at right angles by about 50 very small, transverse ridges.

LARVA. In all instars the larva makes and lives in flat flap nests made by partly cutting a piece at the edge of a leaf and bending this down beneath and securing it with silk. Fully mature larvae may tie together more than one leaf. The head capsules averaged in width as follows: 1st instar (1 larva) .716 mm.; 2d instar (4 larvae) 1.27 mm.; 3d instar (3 larvae) 2.05 mm.; 4th instar (3 larvae) 3.18 mm.; 5th instar (3 larvae) 4.49 mm. In the first four instars the larvae are pale greenish yellow with indistinct cross lines on the segments; the head is blackish with fine, sunken, irregular reticulations and coarse, raised blunt granulations which are most prominent dorsolaterally. The head is shallowly emarginate middorsally, and bears sparse, short, fine setae.

MATURE LARVA (5TH INSTAR). Length when contracted and resting 31–39 mm. Head shallowly emarginate middorsally, with coarse, irregular reticulations between coarse, blunt granulations, the latter largest and most protruding dorsolaterally. Colors darkest in grooves of reticulations, lightest on prominences of granulations. Color bright orange yellow dorsally and laterally, darkening to darker, but bright, orange brown on subventral areas of face. Central, triangular sclerite of face (the frons of most taxonomists, really the true clypeus, Klots, 1966, J. N. Y. Entomol. Soc., 74: 185, footnote) contrastingly light brownish yellow; ventrolateral areas of face similar light brownish yellow on each side below a line from slightly dorsad of most dorsal ocellus over to facial triangle. Ocelli pale, in a narrow, curved, very dark band. Clypeus and mandibles dark brown, labrum pale and colorless. Head clothed with sparse, very short, fine setae.

Prothoracic collar shining, bright orange brown dorsally, paler at lateral ends. Body pale, slightly greenish yellow, darker and more greenish ventrolaterally. A broad, pale, irregular middorsal line, beginning on metathorax and extending caudad to taper out on 8th abdominal segment; middorsally along this a very narrow, darker, greenish line above aorta. A prominent light yellowish, dorsolateral line on each side, beginning on mesothorax and extending caudad to caudal margin of 8th abdominal segment; here a light, transverse line runs across caudal edge of segment, connecting the ends of the dorsolateral lines. Posterior and lateral margins of last abdominal segment (telson) rounded and broadly light yellowish. Narrow, irregular, transverse yellowish lines across most of the segments dorsally and dorsolaterally, especially posteriorly. Each segment more or less covered with small, light yellowish, rounded spots, these tending dorsolaterally to be slightly larger and arranged in single or double, transverse rows. A slightly protruding ventrolateral ridge above bases of legs and prolegs, especially caudally. Prolegs and ventral surface pale green. The larva resting inside its nest usually hooks its body horizontally so that the

head is facing caudad and against the side of the abdomen, commonly at the 6th abdominal segment.

PUPA. Total length of 3 individuals: 18.4, 17.8 and 19.0 mm. Percentages of total length, measurements taken between middorsal limits: head 6, thorax 36, abdomen 58. Dorsoventral diameter of thorax taken at posterior edge of metathorax, 32.2% of total length. Dark reddish brown, surface rough and irregularly reticulate and granulate, where clean and protruding quite shiny. Considerably covered at pupation by a liquid secretion that dries to form a chalky crust. (This, occurring in many Pyrginae, may have an important protective function, perhaps against desiccation.) Mandibular sclerites with no particularly large tubercles or bristles. Each compound eye with a small cluster of dark pigmented, large, protruding, more or less transparent rugosities. Prothoracic spiracle rimmed posteriorly by a very strongly protruding, heavily sclerotized, irregularly ridged, flat, semicircular ring; inside the cephalad concavity of this, leading to the spiracle, a lining of very short, dense hairs. No special hairs or setae on posterior edge of prothorax at cephalic edge of spiracle. On either side of middorsal line along caudal edge of pronotum a series of 4–6 very strong, heavily sclerotized, blunt teeth extending caudad. Last pair of abdominal spiracles particularly small and non-functional. Cremaster arising basally from a very heavily sclerotized, protruding, transverse ridge with many short blunt teeth along its cephalic margin; this runs ventrad to about the middle of each side. Cremaster very heavily sclerotized, its surface very heavily and irregularly rugose, tapering abruptly to a blunt tip bearing a thick cluster of strong hooklets. A deep, triangular depression, its apex caudad, in dorsal surface of cremaster. On either side and caudad of the slitlike genital opening a strong, irregular, longitudinal ridge, which ends caudally in a bicurved, transverse ridge with much enlarged lateral ends. Caudad of this is the slit representing the anal orifice, ventrad of the base of the cremaster.

It is, perhaps, not very fruitful, and is certainly a bit frustrating, thus to describe larval and pupal characters when so little comparative work has been done on these stages. Often we do not know what characters may or may not be valuable, and on what taxonomic level. The blunt teeth on the posterior margin of the pupal prothorax are an example; they appear to be constant in *X. dora*. In 2 pupae of *Epargyreus clarus* and one of *Erynnis icelus* that happen to be at hand there is one such tooth on each side in the *E. clarus*, none in the *E. icelus*. This character, which appears to have escaped general notice, may be very useful in generic or even tribal taxonomy. The structures surrounding the prothoracic spiracle are certainly very important, differing greatly in such other pyrgine genera as *Achalarus*, *Autochton*, *Epargyreus* and *Erynnis*, as Scudder showed long ago. Obviously we need a great deal more life history

work, the specimens resulting from which should be deposited in permanent collections where they will some day be available for comparative work.

All specimens have been deposited in The American Museum of Natural History. I am greatly obliged to Vincent Roth of the Southwestern Research Station for advice about collecting localities and plant identifications, and to Killian Roever for especially appreciated aid in collecting eggs and larvae.